

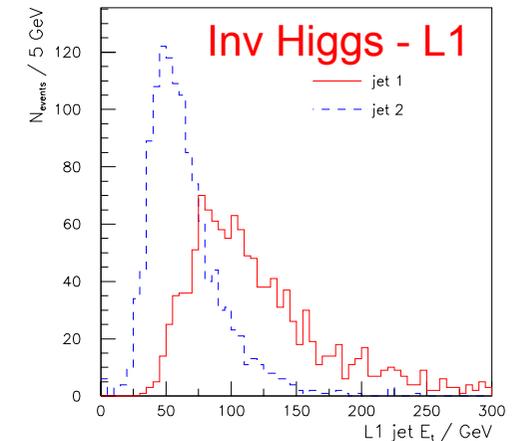
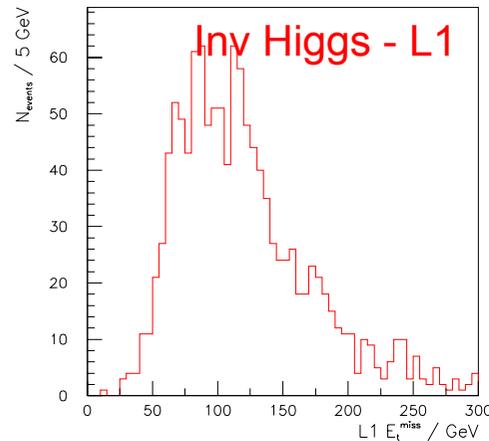
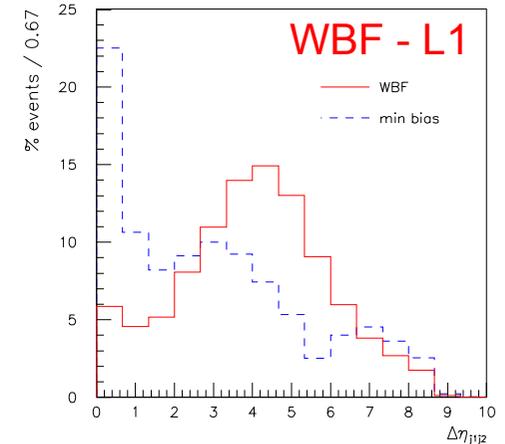
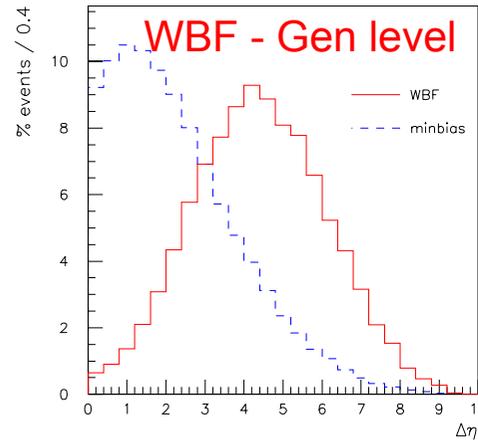


# Di-jet + $\Delta\eta$ Triggers



# Tag Jet Topology

- Triggers studied
  - jj
  - jj + MET
- Including Global Trigger cut
  - $\Delta\eta_{jj} > 3.5$
- $2 \times 10^{33}$  lumi
- 'jj +  $\Delta\eta$ ' not useful for invisible Higgs
- Diffractive physics...?

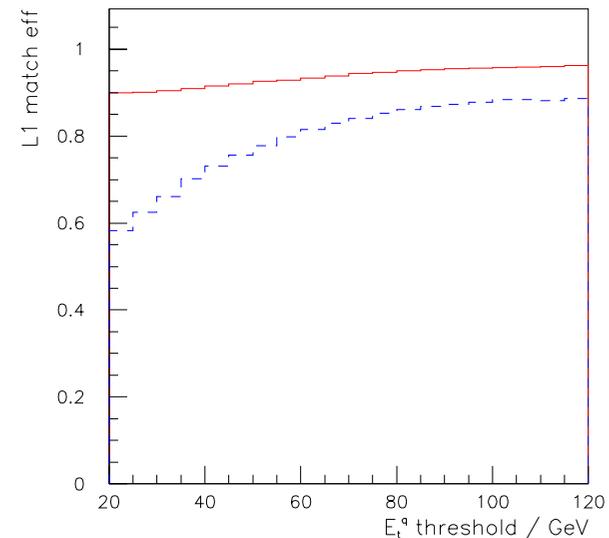
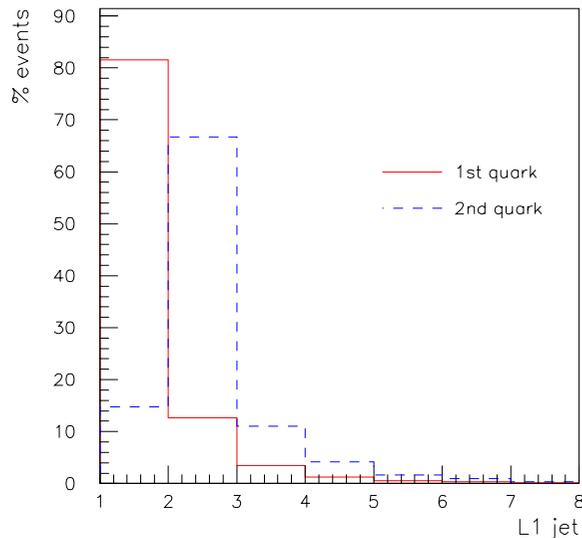




# Tag Jet ID

- Consider 2 highest  $E_t$  L1 jets
  - from central, forward, tau
- ID efficiency
  - match to quarks using  $\Delta R < 1$
  - (valid if no jets from Higgs)

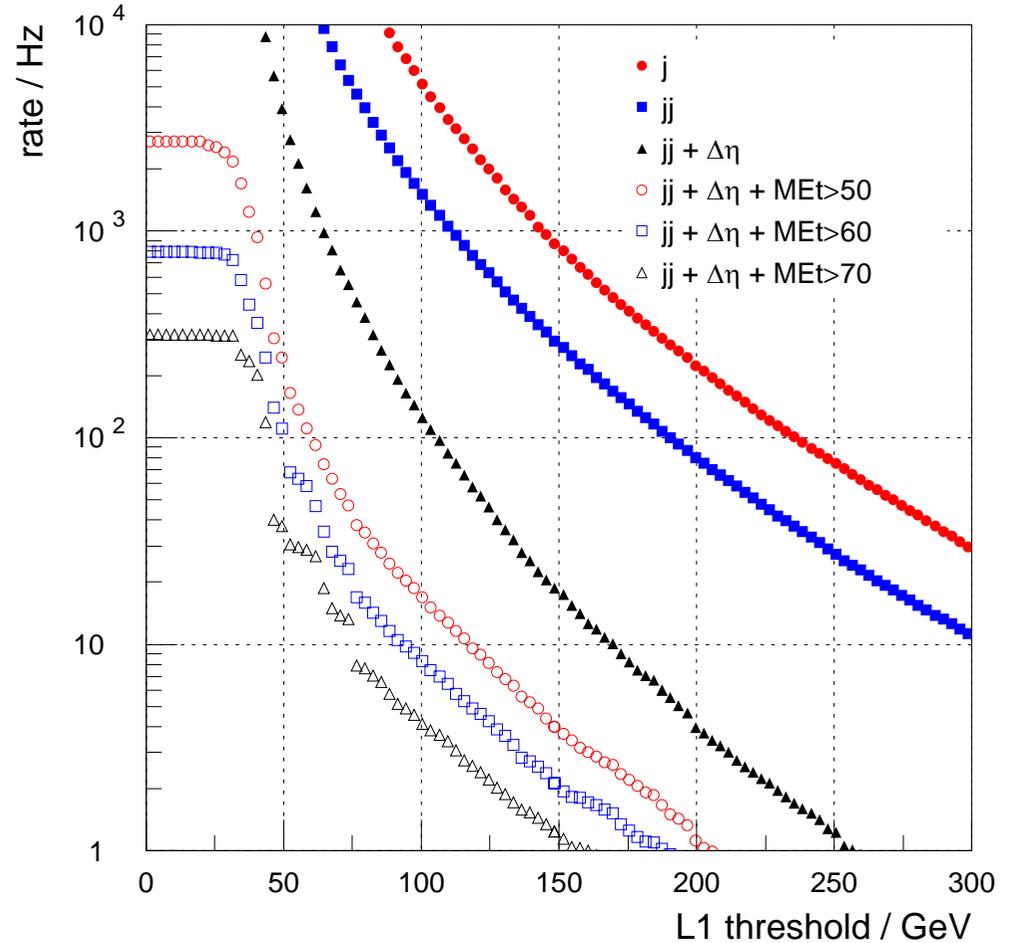
L1 jet(s)	Match Efficiency (%)
1	93
1 & 2	67
1 & 3	7
1 & 4	2
2 & 3	1





# Trigger Rate

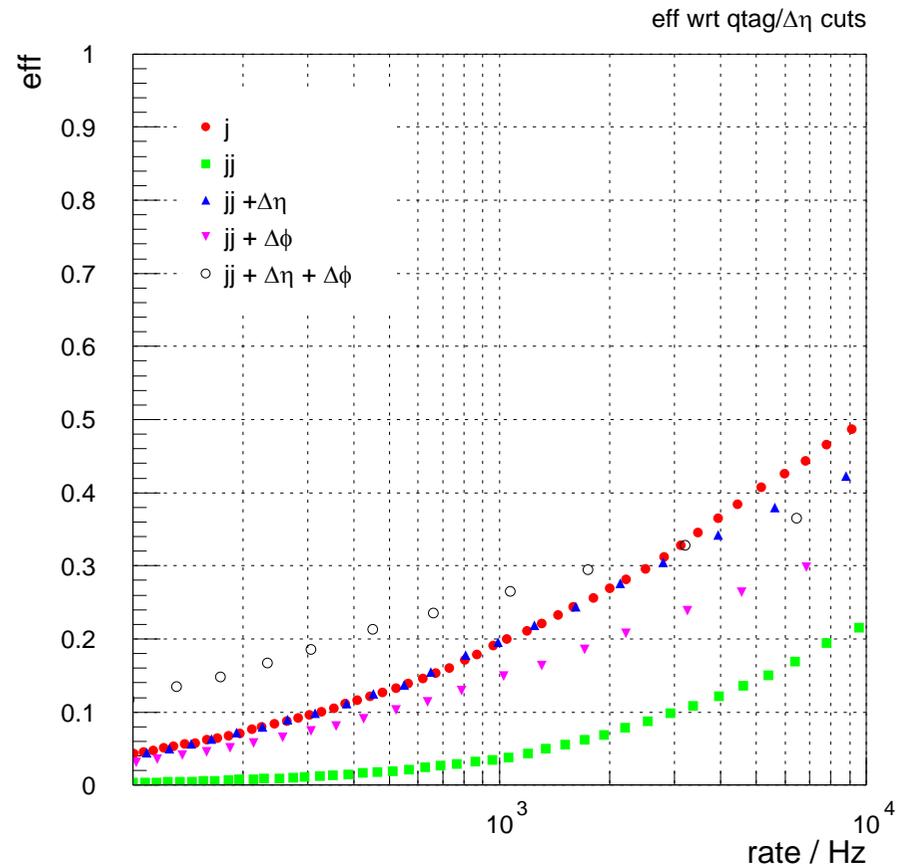
- QCD di-jet (hlt) sample
  - $0 < p_t < 800$  GeV
- $E_t^{\text{miss}}$  cuts correspond to calibrated  $E_t^{\text{miss}}$  of
  - 78, 90, 101 GeV





# Efficiency (WBF)

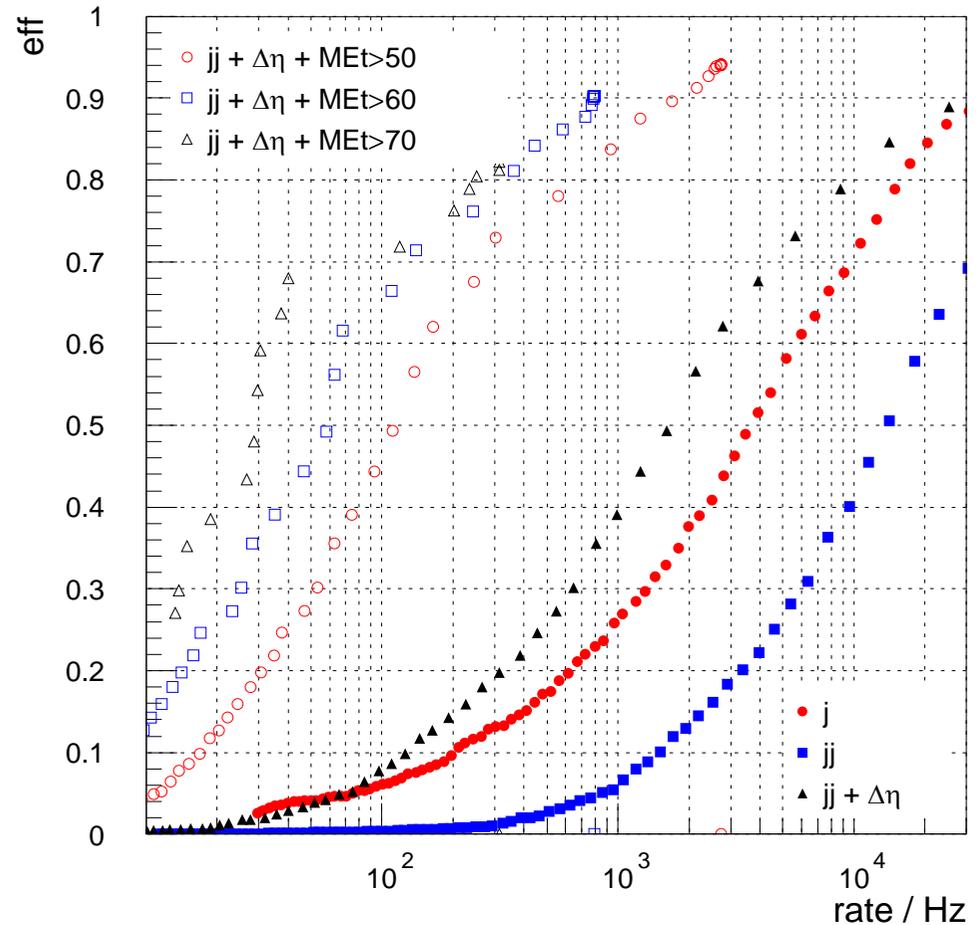
- Efficiency wrt to generator cuts
  - 2 quarks,  $E_t > 20$  GeV,  $|\eta| < 5$
  - $\Delta\eta_{qq} > 3.5$
- 'jj +  $\Delta\eta$ ' offers no improvement over single jet trigger
- No improvement from adding 1<sup>st</sup> & 3<sup>rd</sup> L1 jet pair
  - (jj AND  $\Delta\eta_{12} > 3.5$ ) OR
  - (jjj AND  $\Delta\eta_{13} > 3.5$ )





# Efficiency (inv Higgs)

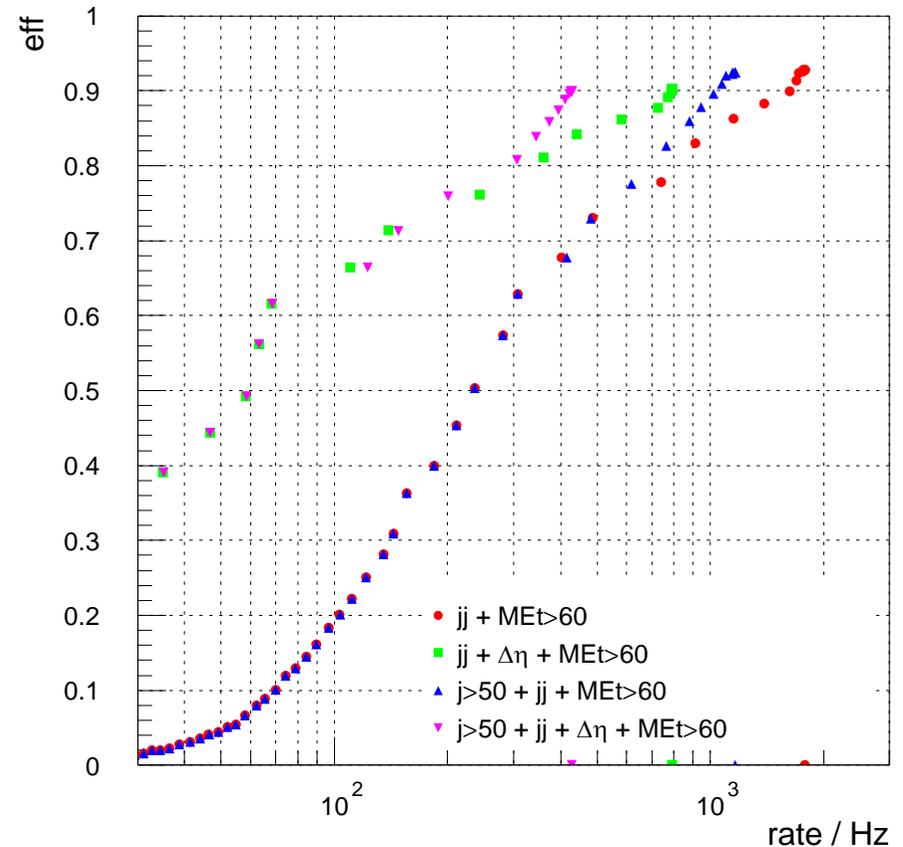
- Efficiency wrt offline cuts on generator quantities :
  - 2 jets,  $E_t > 40$  GeV,  $|\eta| < 5$
  - $E_t^{\text{miss}} > 100$  GeV
  - $\Delta\eta_{jj} > 4.4$
  - $\Delta\phi_{jj} < 1$
- $jj > 33 + \Delta\eta + E_t^{\text{miss}} > 60$ 
  - 86.2 (89.6) % efficiency
  - 725 Hz rate





# Asymmetric di-jet cut

- 1<sup>st</sup> tag quark  $E_t$  distribution starts at  $\sim 50$  GeV (as measured by L1)
- Plot shows 'jj +  $E_t^{\text{miss}}$ ' triggers including 1<sup>st</sup> jet  $E_t > 50$  GeV
- Small reduction in rate at high efficiency





# Summary

Trigger	Threshold(s) (GeV)	Rate (Hz)	Ind Eff (%)	Tot Eff (%)
$j + E_t^{\text{miss}} (*)$	60, 60	800	88.9	89.1
$jj + E_t^{\text{miss}}$	36, 70	605	82.2	85.0
$jj + \Delta\eta + E_t^{\text{miss}}$	33, 60	725	86.2	89.6
$jj + \Delta\eta + E_t^{\text{miss}}$	50, 30, 60	410	87.4	90.4

\* as TDR

- Thresholds above set for ~ 90% total efficiency
  - including  $j$ ,  $jj$ ,  $\tau$ ,  $\tau\tau$ ,  $E_t^{\text{miss}}$  triggers as TDR